

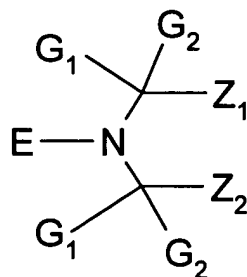
**WHAT IS CLAIMED IS:**

- 1. A flame retardant polymer composition which comprises**
  - (a) an organic polymer substrate and**
  - (b) an effective flame retarding amount of a synergistic mixture of**
    - (i) at least one sterically hindered amine stabilizer and**
    - (ii) at least one conventional flame retardant selected from the group consisting of the organohalogen, phosphorus containing, isocyanurate and melamine based flame retardants and**
    - (iii) at least one acid scavenger.**
- 2. A composition according to claim 1 containing no filler or a filler in an amount less than about 3% by weight based on the weight of the polymer component (a).**
- 3. A composition according to claim 1 containing no antimony compounds or antimony compounds in an amount less than about 1% by weight based on the weight of component (a).**
- 4. A composition according to claim 1 in which the polymer component (a) is a thermoplastic polymer.**

5. A composition according to claim 1 in which the polymer component (a) is selected from the group of resins consisting of the polyolefins, the thermoplastic olefins, styrenic polymers and copolymers, ABS and polymers which contain hetero atoms, double bonds or aromatic rings.

6. A composition according to claim 1 in which the polymer component (a) is selected from polyethylene, polypropylene or copolymers thereof.

7. A composition according to claim 1 in which the stabilizers of component (i) are of the formula



where

$G_1$  and  $G_2$  are independently alkyl of 1 to 8 carbon atoms or are together pentamethylene,

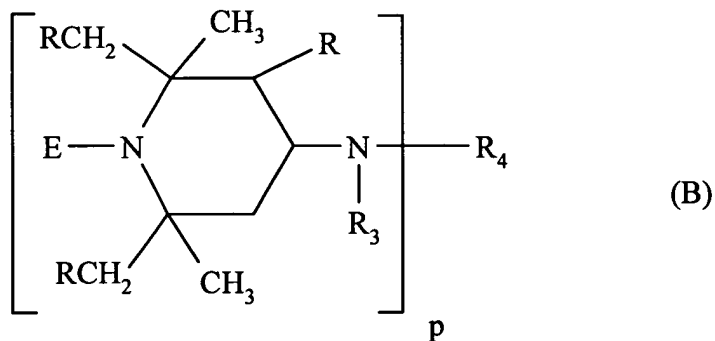
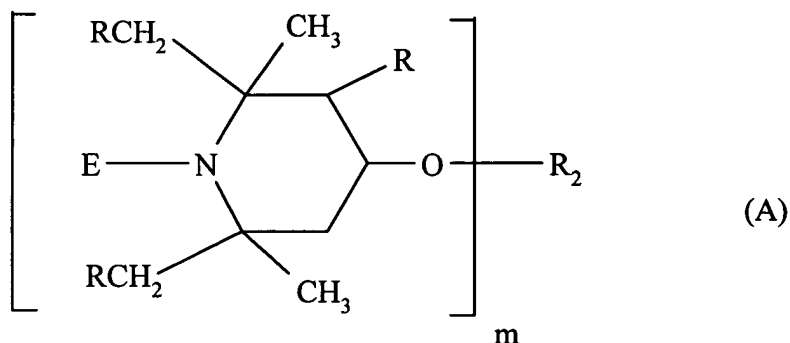
$Z_1$  and  $Z_2$  are each methyl, or  $Z_1$  and  $Z_2$  together form a linking moiety which may additionally be substituted by an ester, ether, amide, amino, carboxy or urethane group, and

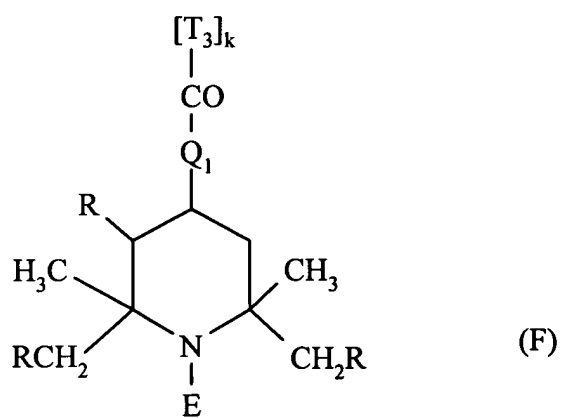
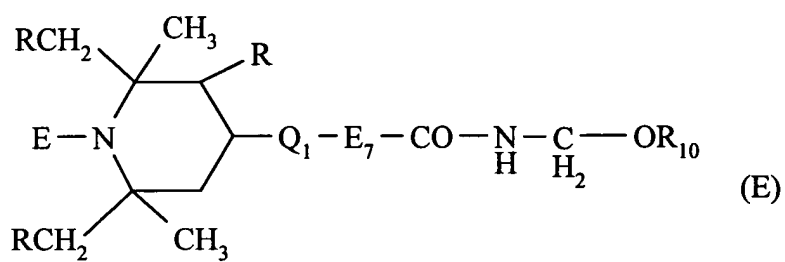
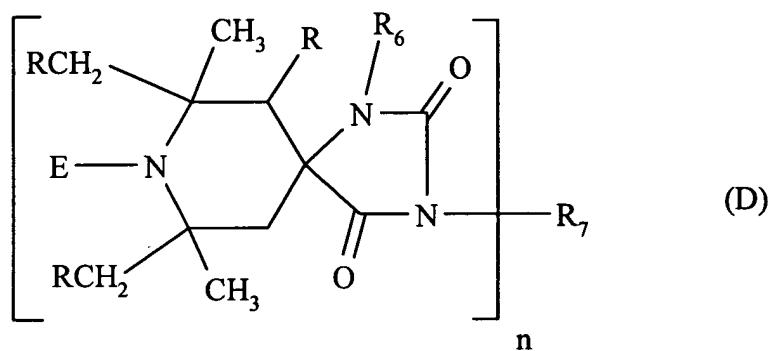
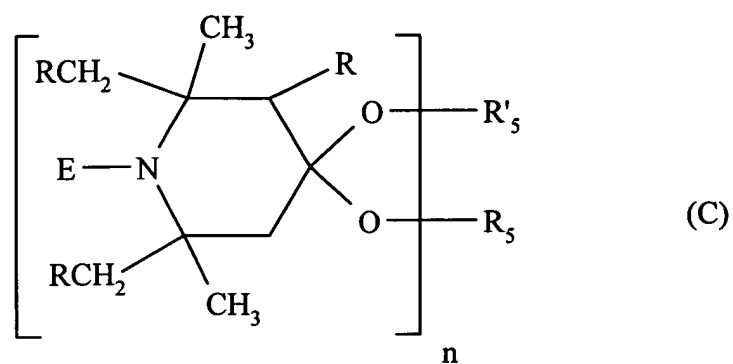
E is oxyl, hydroxyl, alkoxy, cycloalkoxy, aralkoxy, aryloxy,  $-\text{O}-\text{CO}-\text{OZ}_3$ ,  $-\text{O}-\text{Si}(\text{Z}_4)_3$ ,  $-\text{O}-\text{PO}(\text{OZ}_5)_2$  or  $-\text{O}-\text{CH}_2-\text{OZ}_6$  where  $Z_3$ ,  $Z_4$ ,  $Z_5$  and  $Z_6$  are selected from the group consisting of hydrogen, an aliphatic, araliphatic and aromatic moiety; or E is  $-\text{O}-\text{T}-(\text{OH})_b$ ,

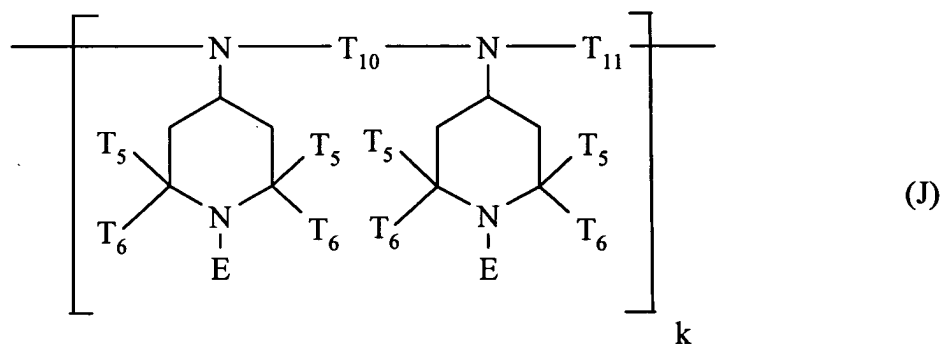
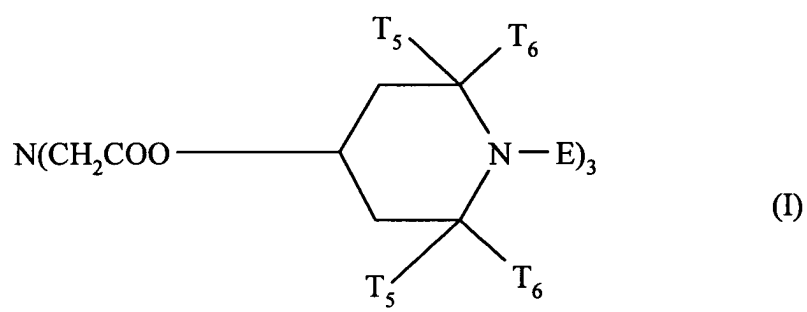
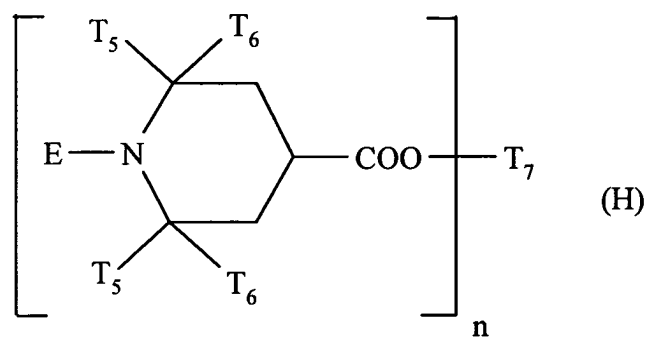
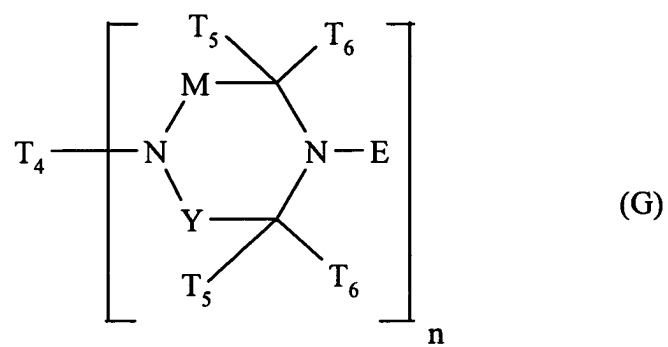
T is a straight or branched chain alkylene of 1 to 18 carbon atoms, cycloalkylene of 5 to 18 carbon atoms, cycloalkenylene of 5 to 18 carbon atoms, a straight or branched chain alkylene of 1 to 4 carbon atoms substituted by phenyl or by phenyl substituted by one or two alkyl groups of 1 to 4 carbon atoms; and

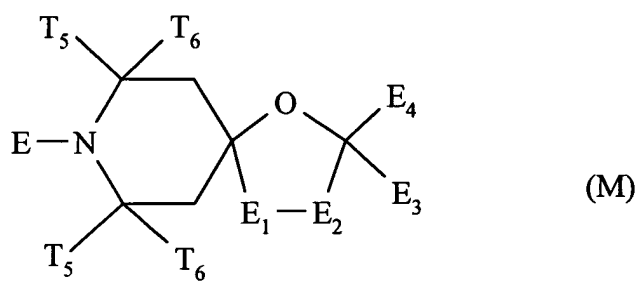
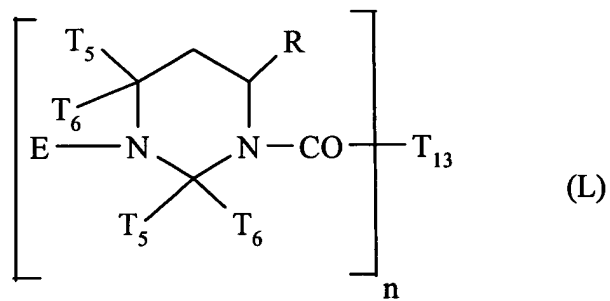
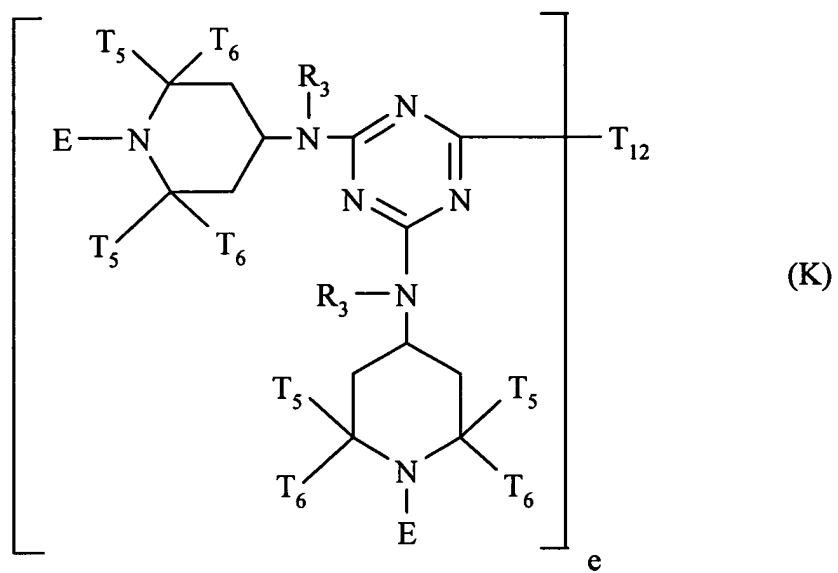
b is 1, 2 or 3 with the proviso that b cannot exceed the number of carbon atoms in T, and when b is 2 or 3, each hydroxyl group is attached to a different carbon atoms of T.

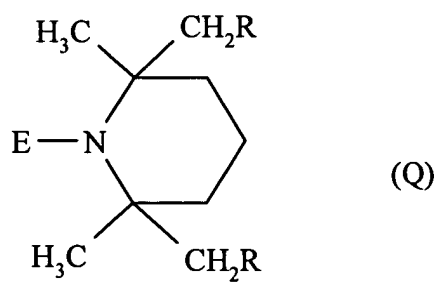
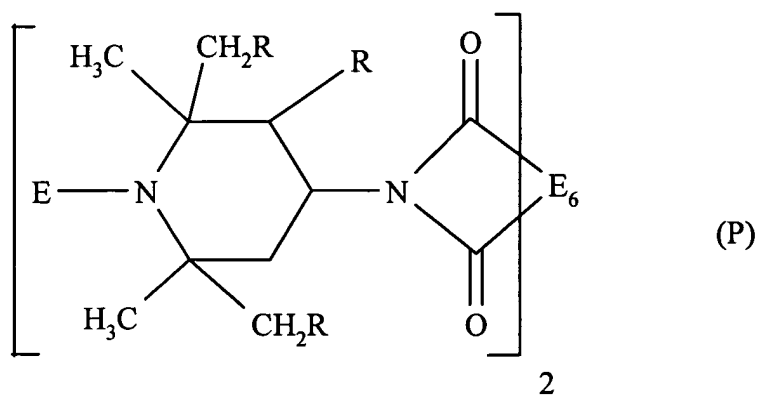
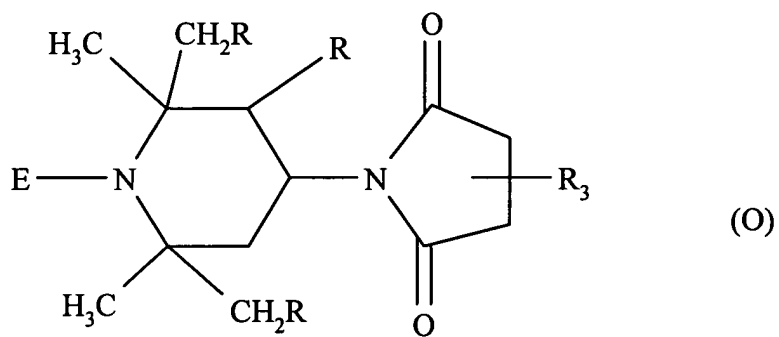
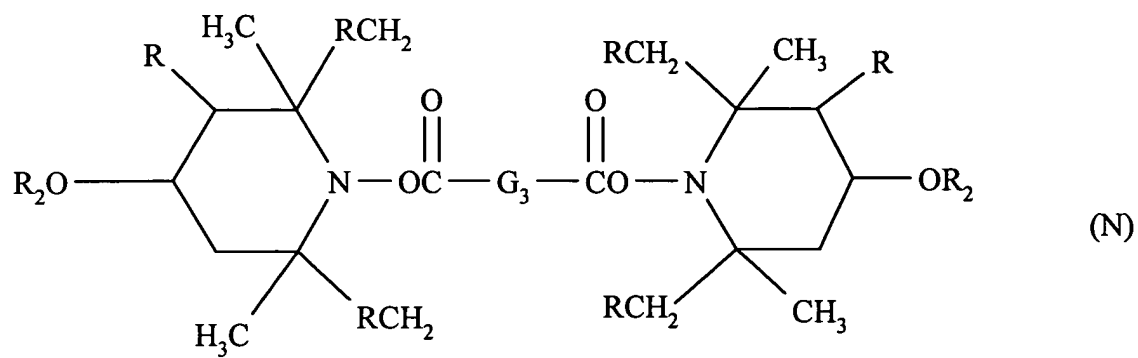
8. A composition according to claim 7 in which the stabilizers of component (i) are of the formula A-R

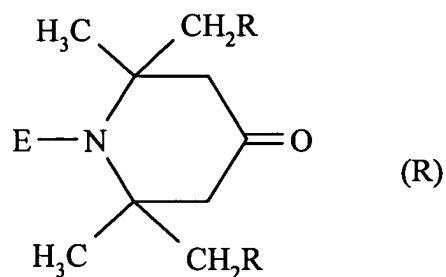












wherein

E is oxyl, hydroxyl, alkoxy of 1 to 18 carbon atoms, cycloalkoxy of 5 to 12 carbon atoms or aralkoxy of 7 to 15 carbon atoms, or E is -O-T-(OH)<sub>b</sub>,

T is a straight or branched chain alkylene of 1 to 18 carbon atoms, cycloalkylene of 5 to 18 carbon atoms, cycloalkenylene of 5 to 18 carbon atoms, a straight or branched chain alkylene of 1 to 4 carbon atoms substituted by phenyl or by phenyl substituted by one or two alkyl groups of 1 to 4 carbon atoms;

b is 1, 2 or 3 with the proviso that b cannot exceed the number of carbon atoms in T, and when b is 2 or 3, each hydroxyl group is attached to a different carbon atoms of T;

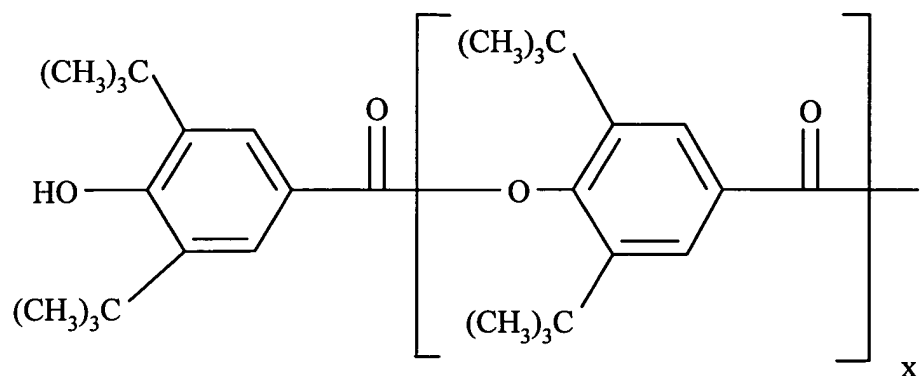
R is hydrogen or methyl,

m is 1 to 4,

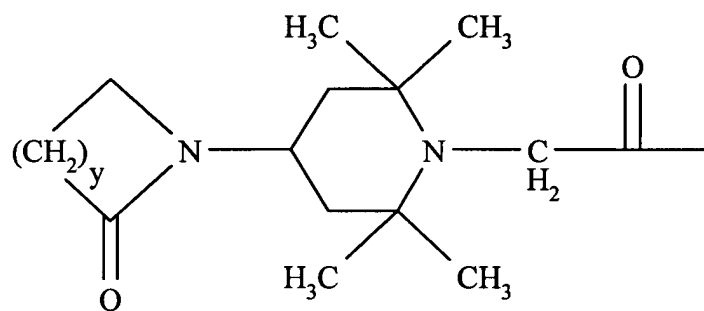
when m is 1,

R<sub>2</sub> is hydrogen, C<sub>1</sub>-C<sub>18</sub>alkyl or said alkyl optionally interrupted by one or more oxygen atoms, C<sub>2</sub>-C<sub>12</sub>alkenyl, C<sub>6</sub>-C<sub>10</sub>aryl, C<sub>7</sub>-C<sub>18</sub>aralkyl, glycidyl, a monovalent acyl radical of an aliphatic, cycloaliphatic or aromatic carboxylic acid, or a carbamic acid, of a cycloaliphatic carboxylic acid having 5-12 C atoms or of an aromatic carboxylic acid having 7-15 C atoms, or





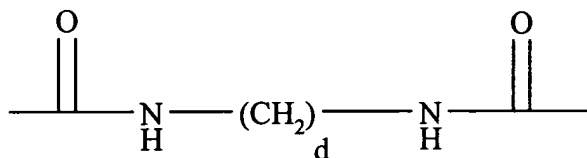
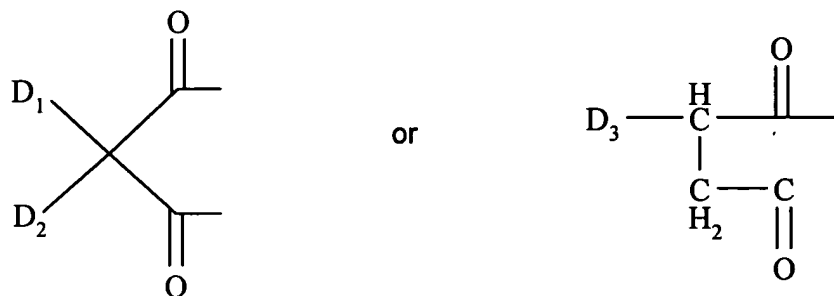
wherein x is 0 or 1,



wherein y is 2-4;

when m is 2,

$R_2$  is  $C_1$ - $C_{12}$ alkylene,  $C_4$ - $C_{12}$ alkenylene, xylylene, a divalent acyl radical of an aliphatic, cycloaliphatic, araliphatic or aromatic dicarboxylic acid or of a dicarbamic acid, of a cycloaliphatic or aromatic dicarboxylic acid having 8-14 C atoms, or of an aliphatic, cycloaliphatic or aromatic dicarbamic acid having 8-14 C atoms;



wherein  $D_1$  and  $D_2$  are independently hydrogen, an alkyl radical containing up to 8 carbon atoms, an aryl or aralkyl radical including 3,5-di-*t*-butyl-4-hydroxybenzyl radical,  $D_3$  is hydrogen, or an alkyl or alkenyl radical containing up to 18 carbon atoms, and  $d$  is 0-20;

when  $m$  is 3,  $R_2$  is a trivalent acyl radical of an aliphatic, unsaturated aliphatic, cycloaliphatic, or aromatic tricarboxylic acid;

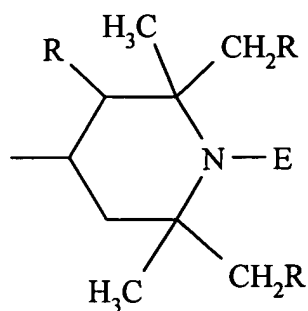
when  $m$  is 4,  $R_2$  is a tetravalent acyl radical of a saturated or unsaturated aliphatic or aromatic tetracarboxylic acid including 1,2,3,4-butanetetracarboxylic acid, 1,2,3,4-but-2-ene-tetracarboxylic, and 1,2,3,5- and 1,2,4,5-pentanetetracarboxylic acid;

$p$  is 1, 2 or 3,

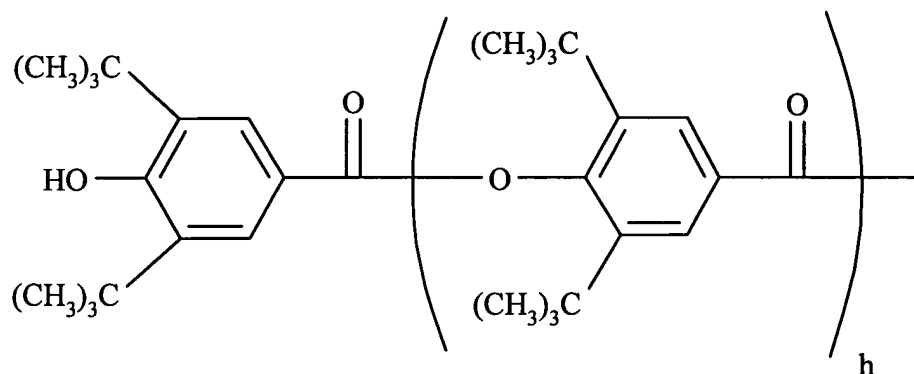
$R_3$  is hydrogen,  $C_1$ - $C_{12}$ alkyl,  $C_5$ - $C_7$ cycloalkyl,  $C_7$ - $C_9$ aralkyl,  $C_2$ - $C_{18}$ alkanoyl,  $C_3$ - $C_5$ alkenoyl or benzoyl;

when  $p$  is 1,

$R_4$  is hydrogen,  $C_1$ - $C_{18}$ alkyl,  $C_5$ - $C_7$ cycloalkyl,  $C_2$ - $C_8$ alkenyl, unsubstituted or substituted by a cyano, carbonyl or carbamide group, aryl, aralkyl, or it is glycidyl, a group of the formula - $CH_2-CH(OH)-Z$  or of the formula - $CO-Z$  or - $CONH-Z$  wherein  $Z$  is hydrogen, methyl or phenyl; or a group of the formulae



or



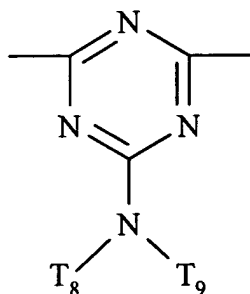
where h is 0 or 1,

$R_3$  and  $R_4$  together, when p is 1, can be alkylene of 4 to 6 carbon atoms or 2-oxo-polyalkylene the cyclic acyl radical of an aliphatic or aromatic 1,2- or 1,3-dicarboxylic acid,

when p is 2,

$R_4$  is a direct bond or is  $C_1$ - $C_{12}$ alkylene,  $C_6$ - $C_{12}$ arylene, xylylene, a  $-CH_2CH(OH)-CH_2$  group or a group  $-CH_2-CH(OH)-CH_2-O-X-O-CH_2-CH(OH)-CH_2-$  wherein X is  $C_2$ - $C_{10}$ alkylene,  $C_6$ - $C_{15}$ arylene or  $C_6$ - $C_{12}$ cycloalkylene; or, provided that  $R_3$  is not alkanoyl, alkenoyl or benzoyl,  $R_4$  can also be a divalent acyl radical of an aliphatic, cycloaliphatic or aromatic dicarboxylic acid or dicarbamic acid, or can be the group  $-CO-$ ; or

$R_4$  is



where T<sub>8</sub> and T<sub>9</sub> are independently hydrogen, alkyl of 1 to 18 carbon atoms, or T<sub>8</sub> and T<sub>9</sub> together are alkylene of 4 to 6 carbon atoms or 3-oxapentamethylene;

when p is 3,

R<sub>4</sub> is 2,4,6-triazinyl,

n is 1 or 2,

when n is 1,

R<sub>5</sub> and R'<sub>5</sub> are independently C<sub>1</sub>-C<sub>12</sub> alkyl, C<sub>2</sub>-C<sub>12</sub> alkenyl, C<sub>7</sub>-C<sub>12</sub> aralkyl, or R<sub>5</sub> is also hydrogen, or R<sub>5</sub> and R'<sub>5</sub> together are C<sub>2</sub>-C<sub>8</sub>alkylene or hydroxyalkylene or C<sub>4</sub>-C<sub>22</sub>acyloxyalkylene;

when n is 2,

R<sub>5</sub> and R'<sub>5</sub> together are (-CH<sub>2</sub>)<sub>2</sub>C(CH<sub>2</sub>)<sub>2</sub>;

R<sub>6</sub> is hydrogen, C<sub>1</sub>-C<sub>12</sub>alkyl, allyl, benzyl, glycidyl or C<sub>2</sub>-C<sub>6</sub>alkoxyalkyl;

when n is 1,

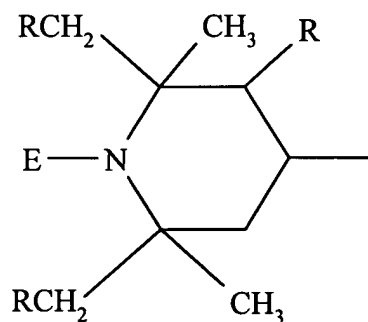
R<sub>7</sub> is hydrogen, C<sub>1</sub>-C<sub>12</sub>alkyl, C<sub>3</sub>-C<sub>5</sub>alkenyl, C<sub>7</sub>-C<sub>9</sub>aralkyl, C<sub>5</sub>-C<sub>7</sub>cycloalkyl, C<sub>2</sub>-C<sub>4</sub>hydroxyalkyl, C<sub>2</sub>-C<sub>6</sub>alkoxyalkyl, C<sub>6</sub>-C<sub>10</sub> aryl, glycidyl, a group of the formula -(CH<sub>2</sub>)<sub>t</sub>-COO-Q or of the formula -(CH<sub>2</sub>)<sub>t</sub>-O-CO-Q wherein t is 1 or 2, and Q is C<sub>1</sub>-C<sub>4</sub>alkyl or phenyl; or

when n is 2,

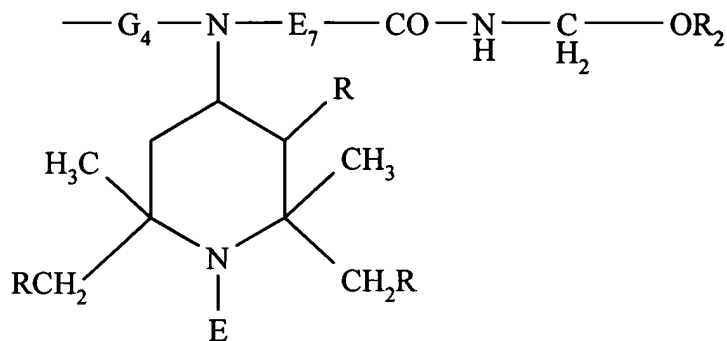
$R_7$  is  $C_2$ - $C_{12}$ alkylene,  $C_6$ - $C_{12}$ arylene, a group  $-CH_2CH(OH)-CH_2-O-X-O-CH_2-CH(OH)-CH_2-$  wherein  $X$  is  $C_2$ - $C_{10}$ alkylene,  $C_6$ - $C_{15}$ arylene or  $C_6$ - $C_{12}$ cycloalkylene, or a group  $-CH_2CH(OZ')CH_2-(OCH_2-CH(OZ')CH_2)_2-$  wherein  $Z'$  is hydrogen,  $C_1$ - $C_{18}$ alkyl, allyl, benzyl,  $C_2$ - $C_{12}$ alkanoyl or benzoyl;

$Q_1$  is  $-N(R_8)-$  or  $-O-$ ;  $E_7$  is  $C_1$ - $C_3$  alkylene, the group  $-CH_2-CH(R_9)-O-$  wherein  $R_9$  is hydrogen, methyl or phenyl, the group  $-(CH_2)_3-NH-$  or a direct bond;

$R_{10}$  is hydrogen or  $C_1$ - $C_{18}$  alkyl,  $R_8$  is hydrogen,  $C_1$ - $C_{18}$ alkyl,  $C_5$ - $C_7$ cycloalkyl,  $C_7$ - $C_{12}$ aralkyl, cyanoethyl,  $C_6$ - $C_{10}$ aryl, the group  $-CH_2-CH(R_9)-OH$  wherein  $R_9$  has the meaning defined above; a group of the formula



or a group of the formula



wherein  $G_4$  is  $C_2$ - $C_6$ alkylene or  $C_6$ - $C_{12}$ arylene; or  $R_8$  is a group  $-E_7-CO-NH-CH_2-OR_{10}$ ;

Formula F denotes a recurring structural unit of a polymer where  $T_3$  is ethylene or 1,2-propylene, is the repeating structural unit derived from an alpha-olefin copolymer with an alkyl acrylate or methacrylate; and where k is 2 to 100;

$T_4$  has the same meaning as  $R_4$  when p is 1 or 2,

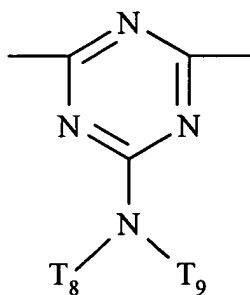
$T_5$  is methyl,

$T_6$  is methyl or ethyl, or  $T_5$  and  $T_6$  together are tetramethylene or pentamethylene,

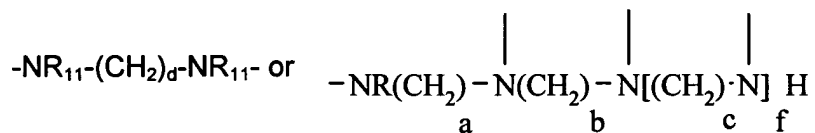
M and Y are independently methylene or carbonyl, and  $T_4$  is ethylene where n is 2;

$T_7$  is the same as  $R_7$ ,

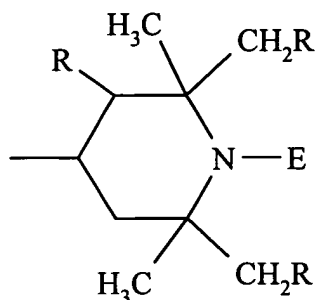
$T_{10}$  and  $T_{11}$  are independently alkylene of 2 to 12 carbon atoms, or  $T_{11}$  is



$T_{12}$  is piperazinyl,



where  $R_{11}$  is the same as  $R_3$  or is also



a, b and c are independently 2 or 3, and f is 0 or 1; and

e is 2, 3 or 4;

$T_{13}$  is the same as  $R_2$  with the proviso that  $T_{13}$  cannot be hydrogen when n is 1;

$E_1$  and  $E_2$ , being different, each are -CO- or -N( $E_5$ )- where  $E_5$  is hydrogen,  $C_1$ - $C_{12}$  alkyl or  $C_4$ - $C_{22}$  alkoxyalkylalkyl,

$E_3$  is hydrogen, alkyl of 1 to 30 carbon atoms, phenyl, naphthyl, said phenyl or said naphthyl substituted by chlorine or by alkyl of 1 to 4 carbon atoms, or phenylalkyl of 7 to 12 carbon atoms, or said phenylalkyl substituted by alkyl of 1 to 4 carbon atoms,

$E_4$  is hydrogen, alkyl of 1 to 30 carbon atoms, phenyl, naphthyl or phenylalkyl of 7 to 12 carbon atoms, or

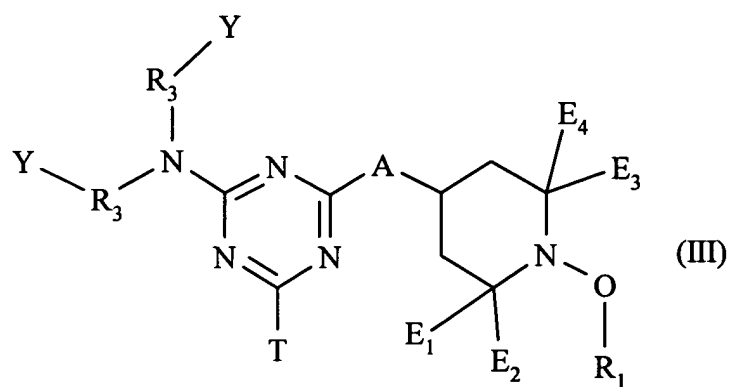
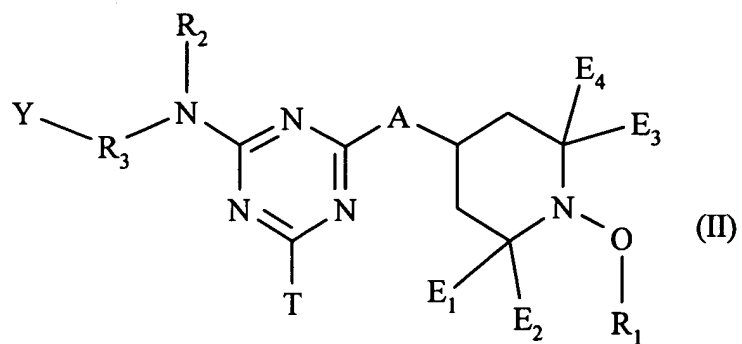
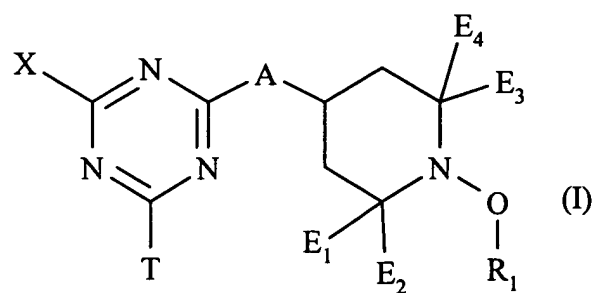
$E_3$  and  $E_4$  together are polymethylene of 4 to 17 carbon atoms, or said polymethylene substituted by up to four alkyl groups of 1 to 4 carbon atoms,

$E_6$  is an aliphatic or aromatic tetravalent radical,

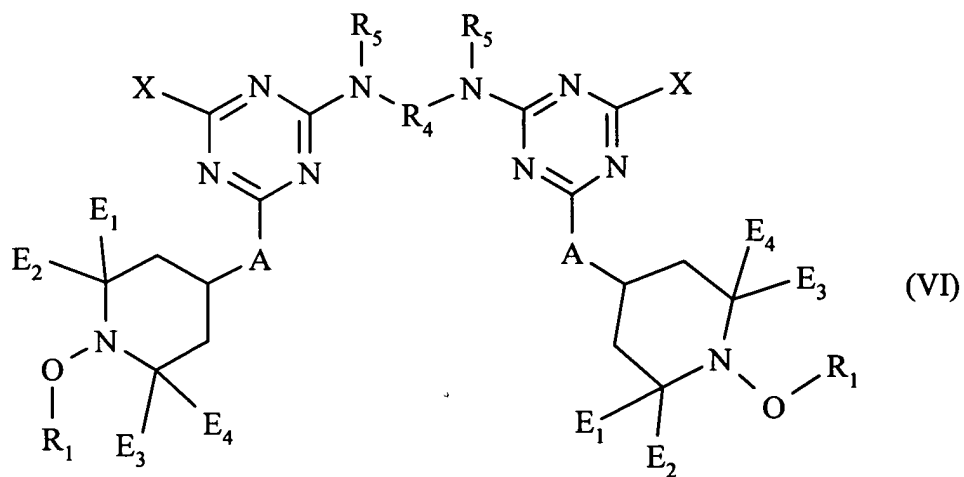
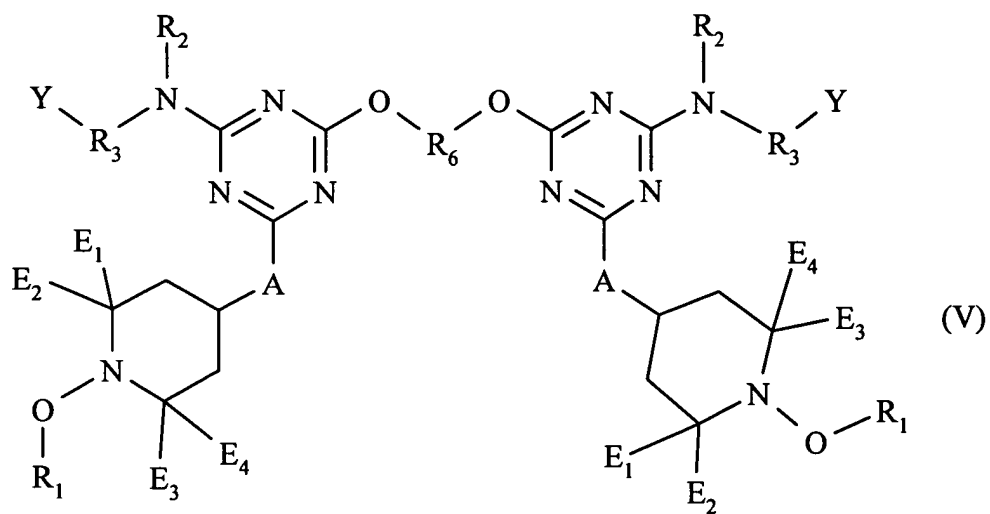
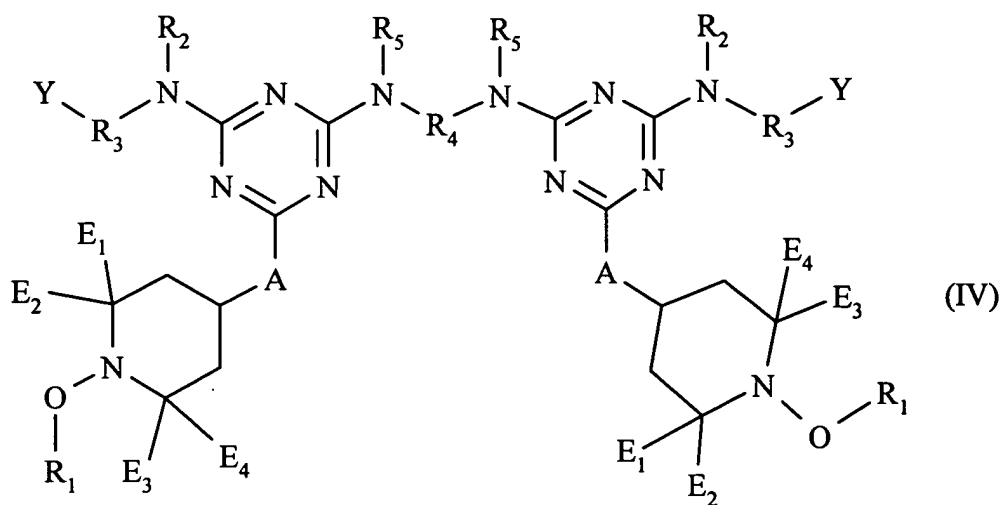
$R_2$  of formula (N) is a previously defined when m is 1;

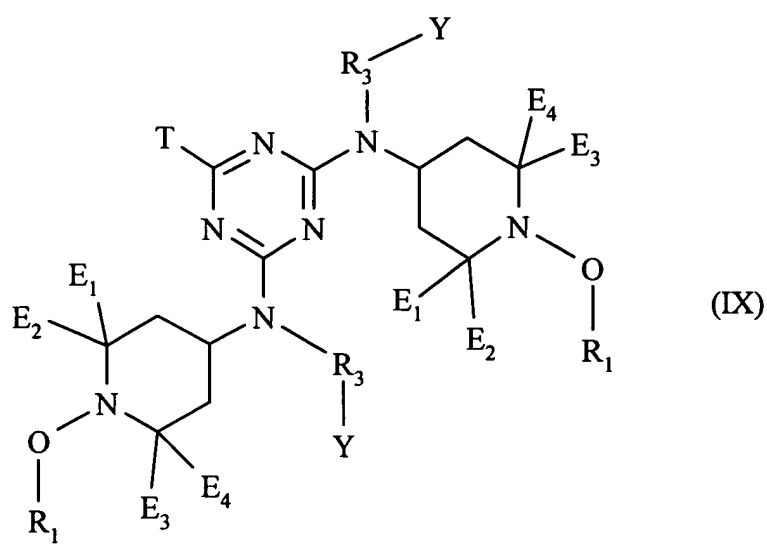
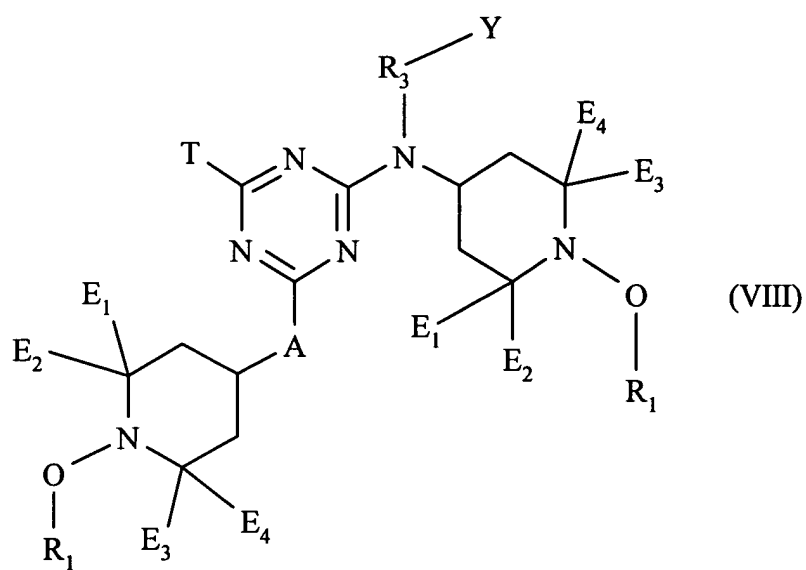
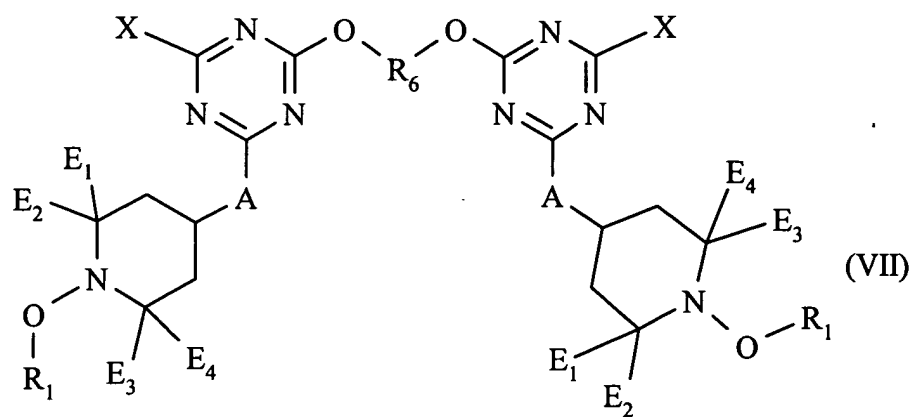
$G_1$  a direct bond,  $C_1$ - $C_{12}$  alkylene, phenylene or -NH- $G'$ -NH wherein  $G'$  is  $C_1$ - $C_{12}$  alkylene; or

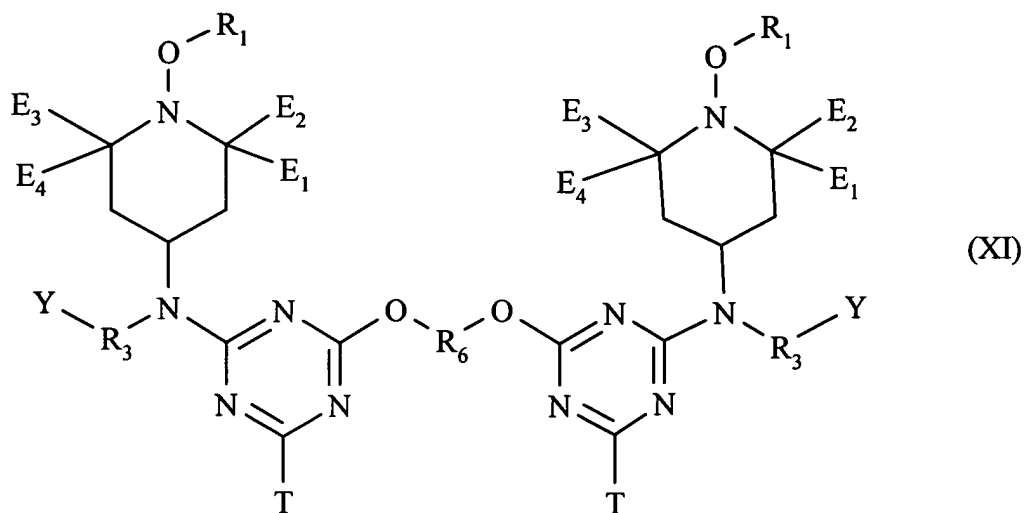
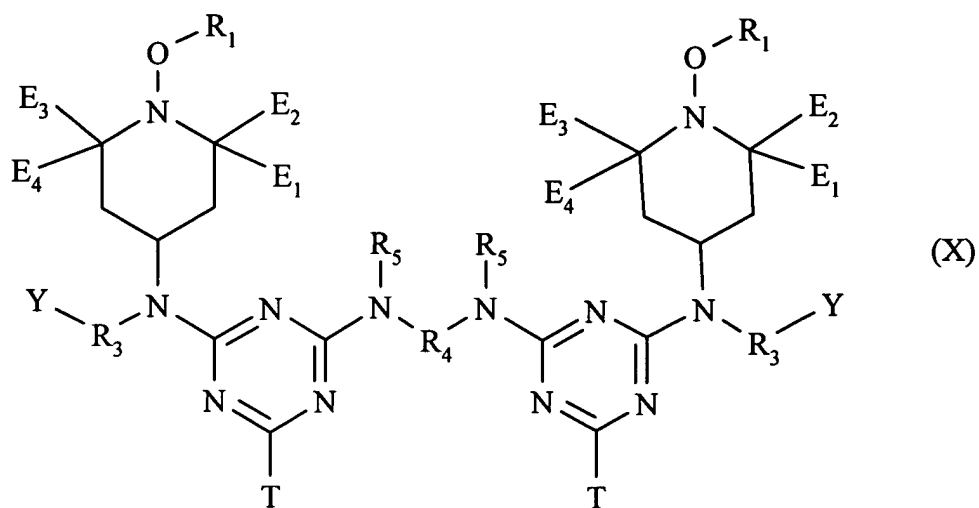
wherein the hindered amine compound is a compound of the formula I, II, III, IV, V, VI, VII, VIII, IX, X or XI











wherein

E<sub>1</sub>, E<sub>2</sub>, E<sub>3</sub> and E<sub>4</sub> are independently alkyl of 1 to 4 carbon atoms, or E<sub>1</sub> and E<sub>2</sub> are independently alkyl of 1 to 4 carbon atoms and E<sub>3</sub> and E<sub>4</sub> taken together are pentamethylene, or E<sub>1</sub> and E<sub>2</sub>; and E<sub>3</sub> and E<sub>4</sub> each taken together are pentamethylene,

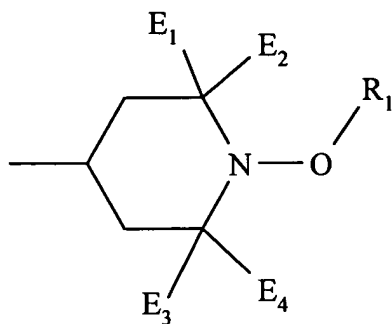
R<sub>1</sub> is alkyl of 1 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, a bicyclic or tricyclic hydrocarbon radical of 7 to 12 carbon atoms, phenylalkyl of 7 to 15 carbon atoms, aryl of 6 to 10 carbon atoms or said aryl substituted by one to three alkyl of 1 to 8 carbon atoms,

$R_2$  is hydrogen or a linear or branched chain alkyl of 1 to 12 carbon atoms,

$R_3$  is alkylene of 1 to 8 carbon atoms, or  $R_3$  is  $-\text{CO}-$ ,  $-\text{CO}-R_4-$ ,  $-\text{CONR}_2-$ , or  $-\text{CO}-\text{NR}_2-R_4-$ ,

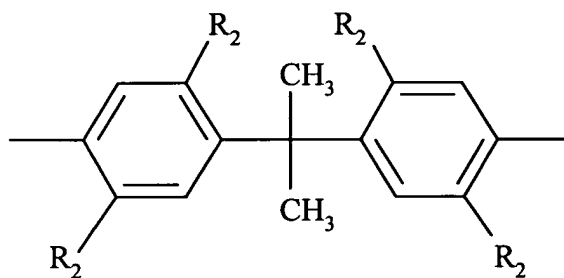
$R_4$  is alkylene of 1 to 8 carbon atoms,

$R_5$  is hydrogen, a linear or branched chain alkyl of 1 to 12 carbon atoms, or



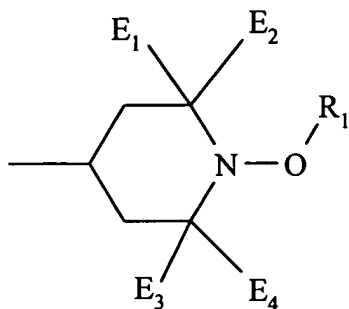
or when  $R_4$  is ethylene, two  $R_5$  methyl substituents can be linked by a direct bond so that the triazine bridging group  $-\text{N}(R_5)-R_4-\text{N}(R_5)-$  is a piperazin-1,4-diyl moiety,

$R_6$  is alkylene of 2 to 8 carbon atoms or  $R_6$  is

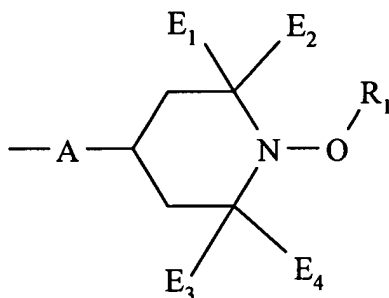


with the proviso that Y is not  $-\text{OH}$  when  $R_6$  is the structure depicted above,

A is  $-\text{O}-$  or  $-\text{NR}_7-$  where  $R_7$  is hydrogen, a straight or branched chain alkyl of 1 to 12 carbon atoms, or  $R_7$  is



T is phenoxy, phenoxy substituted by one or two alkyl groups of 1 to 4 carbon atoms, alkoxy of 1 to 8 carbon atoms or  $-N(R_2)_2$  with the stipulation that  $R_2$  is not hydrogen, or T is

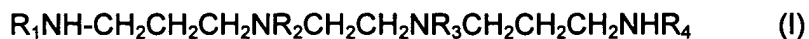


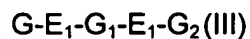
X is  $-NH_2$ ,  $-NCO$ ,  $-OH$ ,  $-O$ -glycidyl, or  $-NHNH_2$ , and

Y is  $-OH$ ,  $-NH_2$ ,  $-NHR_2$  where  $R_2$  is not hydrogen; or Y is  $-NCO$ ,  $-COOH$ , oxiranyl,  $-O$ -glycidyl, or  $-Si(OR_2)_3$ ; or the combination  $R_3-Y-$  is  $-CH_2CH(OH)R_2$  where  $R_2$  is alkyl or said alkyl interrupted by one to four oxygen atoms, or  $R_3-Y-$  is  $-CH_2OR_2$ ;

or

wherein the hindered amine compound is a mixture of  $N,N',N''$ -tris{2,4-bis[(1-hydrocarbyloxy-2,2,6,6-tetramethylpiperidin-4-yl)alkylamino]-s-triazin-6-yl}-3,3'-ethylenediiminodipropylamine;  $N,N',N''$ -tris{2,4-bis[(1-hydrocarbyloxy-2,2,6,6-tetramethylpiperidin-4-yl)alkylamino]-s-triazin-6-yl}-3,3'-ethylenediiminodipropylamine, and bridged derivatives as described by formulas I, II, IIA and III

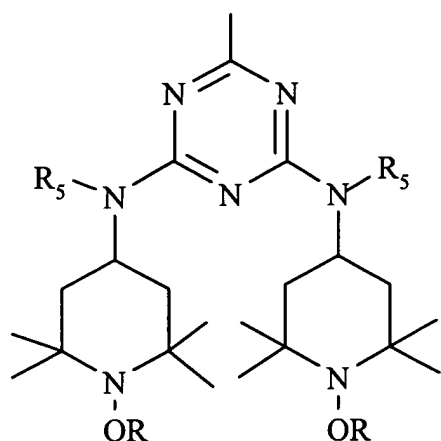




where in the tetraamine of formula I

$R_1$  and  $R_2$  are the s-triazine moiety E; and one of  $R_3$  and  $R_4$  is the s-triazine moiety E with the other of  $R_3$  or  $R_4$  being hydrogen,

E is



R is methyl, propyl, cyclohexyl or octyl,

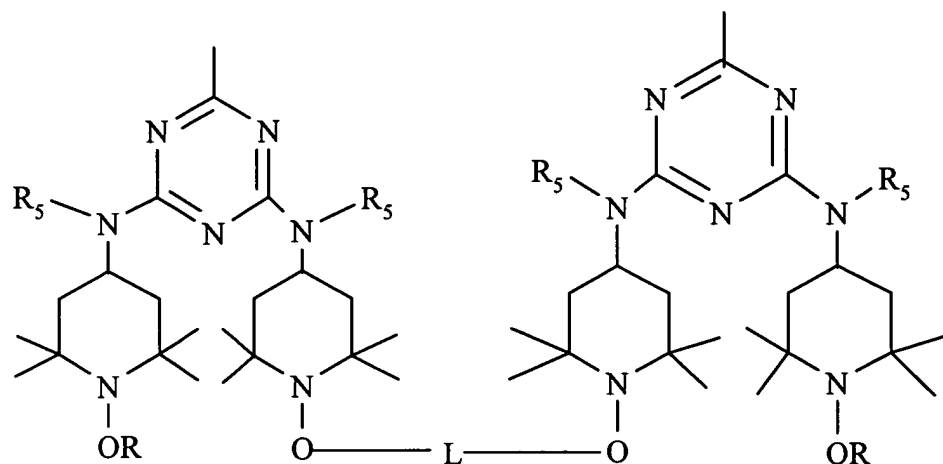
$R_5$  is alkyl of 1 to 12 carbon atoms,

where in the compound of formula II or IIA when R is propyl, cyclohexyl or octyl,

T and  $T_1$  are each a tetraamine substituted by  $R_1$ - $R_4$  as is defined for formula I, where

(1) one of the s-triazine moieties E in each tetraamine is replaced by the group  $E_1$  which forms a bridge between two tetraamines T and  $T_1$ ,

E<sub>1</sub> is



or

(2) the group E<sub>1</sub> can have both termini in the same tetraamine T as in formula IIA where two of the E moieties of the tetraamine are replaced by one E<sub>1</sub> group, or

(3) all three s-triazine substituents of tetraamine T can be E<sub>1</sub> such that one E<sub>1</sub> links T and T<sub>1</sub> and a second E<sub>1</sub> has both termini in tetraamine T,

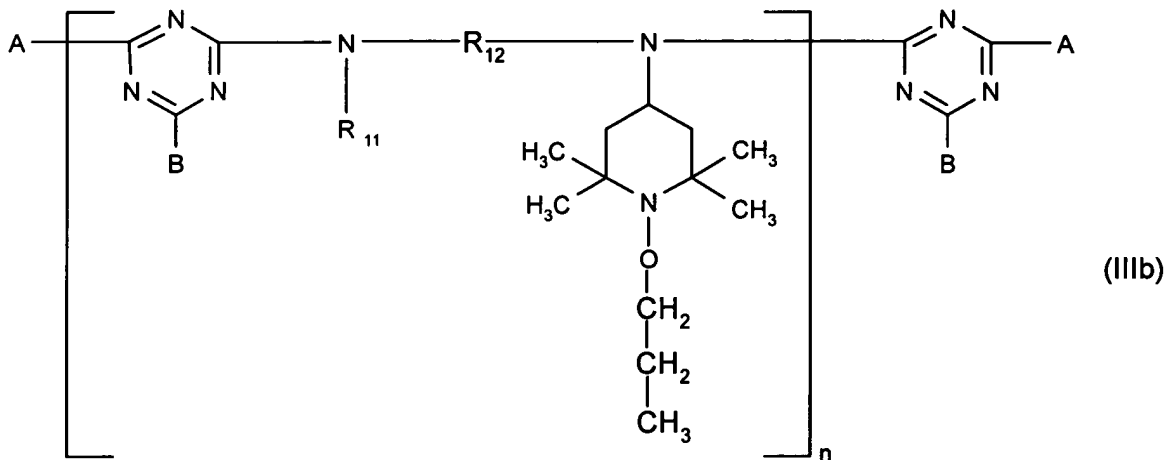
L is propanediyl, cyclohexanediyl or octanediyl;

where in the compound of formula III

G, G<sub>1</sub> and G<sub>2</sub> are each tetraamines substituted by R<sub>1</sub>-R<sub>4</sub> as defined for formula I, except that G and G<sub>2</sub> each have one of the s-triazine moieties E replaced by E<sub>1</sub>, and G<sub>1</sub> has two of the triazine moieties E replaced by E<sub>1</sub>, so that there is a bridge between G and G<sub>1</sub> and a second bridge between G<sub>1</sub> and G<sub>2</sub>;

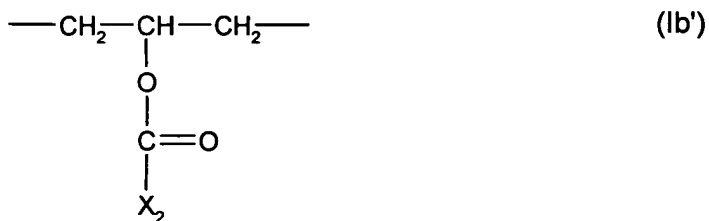
which mixture is prepared by reacting two to four equivalents of 2,4-bis[(1-hydrocarbyloxy-2,2,6,6-tetramethylpiperidin-4-yl)butylamino]-6-chloro-s-triazine with one equivalent of N,N'-bis(3-aminopropyl)ethylenediamine;

or the hindered amine is a compound of the formula IIIb

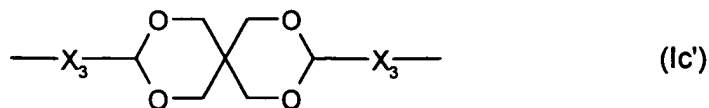


in which the index n ranges from 1 to 15;

$R_{12}$  is  $C_2$ - $C_{12}$ alkylene,  $C_4$ - $C_{12}$ alkenylene,  $C_5$ - $C_7$ cycloalkylene,  $C_5$ - $C_7$ cycloalkylene-di( $C_1$ - $C_4$ alkylene),  $C_1$ - $C_4$ alkylenedi( $C_5$ - $C_7$ cycloalkylene), phenylenedi( $C_1$ - $C_4$ alkylene) or  $C_4$ - $C_{12}$ alkylene interrupted by 1,4-piperazinediyl, -O- or  $>N-X_1$  with  $X_1$  being  $C_1$ - $C_{12}$ acyl or ( $C_1$ - $C_{12}$ alkoxy)carbonyl or having one of the definitions of  $R_{14}$  given below except hydrogen; or  $R_{12}$  is a group of the formula (Ib') or (Ic');







with m being 2 or 3,

$X_2$  being  $C_1$ - $C_{18}$ alkyl,  $C_5$ - $C_{12}$ cycloalkyl which is unsubstituted or substituted by 1, 2 or 3  $C_1$ - $C_4$ alkyl; phenyl which is unsubstituted or substituted by 1, 2 or 3  $C_1$ - $C_4$ alkyl or  $C_1$ - $C_4$ alkoxy;  $C_7$ - $C_9$ phenylalkyl which is unsubstituted or substituted on the phenyl by 1, 2 or 3  $C_1$ - $C_4$ alkyl; and

the radicals  $X_3$  being independently of one another  $C_2$ - $C_{12}$ alkylene;

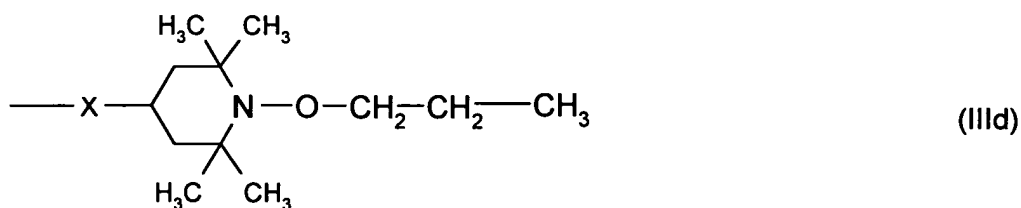
$R_{13}$ ,  $R_{14}$  and  $R_{15}$ , which are identical or different, are hydrogen,  $C_1$ - $C_{18}$ alkyl,  $C_5$ - $C_{12}$ cycloalkyl which is unsubstituted or substituted by 1, 2 or 3  $C_1$ - $C_4$ alkyl;  $C_3$ - $C_{18}$ alkenyl, phenyl which is unsubstituted or substituted by 1, 2 or 3  $C_1$ - $C_4$ alkyl or  $C_1$ - $C_4$ alkoxy;  $C_7$ - $C_9$ phenylalkyl which is unsubstituted or substituted on the phenyl by 1, 2 or 3  $C_1$ - $C_4$ alkyl; tetrahydrofurfuryl or  $C_2$ - $C_4$ alkyl which is substituted in the 2, 3 or 4 position by -OH,  $C_1$ - $C_8$ alkoxy, di( $C_1$ - $C_4$ alkyl)amino or a group of the formula (Ie');



with Y being -O-, -CH<sub>2</sub>-, -CH<sub>2</sub>CH<sub>2</sub>- or >N-CH<sub>3</sub>,

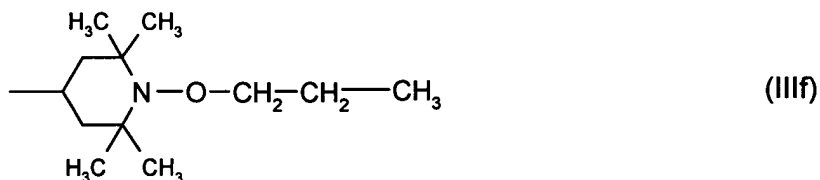
or -N( $R_{14}$ )( $R_{15}$ ) is additionally a group of the formula (Ie');

the radicals A are independently of one another -OR<sub>13</sub>, -N( $R_{14}$ )( $R_{15}$ ) or a group of the formula (IIId);



X is -O- or >N-R<sub>16</sub>;

R<sub>16</sub> is hydrogen, C<sub>1</sub>-C<sub>18</sub>alkyl, C<sub>3</sub>-C<sub>18</sub>alkenyl, C<sub>5</sub>-C<sub>12</sub>cycloalkyl which is unsubstituted or substituted by 1, 2 or 3 C<sub>1</sub>-C<sub>4</sub>alkyl; C<sub>7</sub>-C<sub>9</sub>phenylalkyl which is unsubstituted or substituted on the phenyl by 1, 2 or 3 C<sub>1</sub>-C<sub>4</sub>alkyl; tetrahydrofurfuryl, a group of the formula (III f),



or C<sub>2</sub>-C<sub>4</sub>alkyl which is substituted in the 2, 3 or 4 position by -OH, C<sub>1</sub>-C<sub>8</sub>alkoxy, di(C<sub>1</sub>-C<sub>4</sub>alkyl)amino or a group of the formula (Ie');

R<sub>11</sub> has one of the definitions given for R<sub>16</sub>; and

the radicals B have independently of one another one of the definitions given for A.

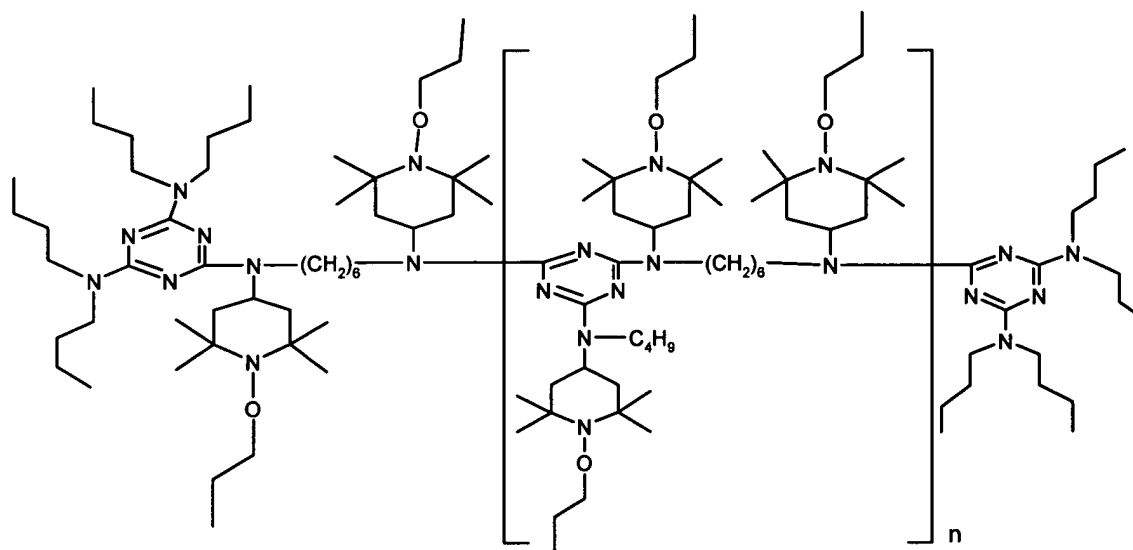
**9. A composition according to claim 8 wherein the stabilizers of component (i) are selected from the group consisting of**

1-cyclohexyloxy-2,2,6,6-tetramethyl-4-octadecylaminopiperidine;  
bis(1-octyloxy-2,2,6,6-tetramethylpiperidin-4-yl) sebacate;  
2,4-bis[(1-cyclohexyloxy-2,2,6,6-tetramethylpiperidin-4-yl)butylamino]-6-(2-hydroxyethyl-amino-s-triazine);  
bis(1-cyclohexyloxy-2,2,6,6-tetramethylpiperidin-4-yl) adipate;  
2,4-bis[(1-cyclohexyloxy-2,2,6,6-tetramethylpiperidin-4-yl)butylamino]-6-chloro-s-triazine;  
1-(2-hydroxy-2-methylpropoxy)-4-hydroxy-2,2,6,6-tetramethylpiperidine;  
1-(2-hydroxy-2-methylpropoxy)-4-oxo-2,2,6,6-tetramethylpiperidine;  
1-(2-hydroxy-2-methylpropoxy)-4-octadecanoyloxy-2,2,6,6-tetramethylpiperidine;  
bis(1-(2-hydroxy-2-methylpropoxy)-2,2,6,6-tetramethylpiperidin-4-yl) sebacate;  
bis(1-(2-hydroxy-2-methylpropoxy)-2,2,6,6-tetramethylpiperidin-4-yl) adipate;

2,4-bis{N-[1-(2-hydroxy-2-methylpropoxy)-2,2,6,6-tetramethylpiperidin-4-yl]-N-butyl-amino}-6-(2-hydroxyethylamino)-s-triazine;

the reaction product of 2,4-bis[(1-cyclohexyloxy-2,2,6,6-tetramethylpiperidin-4-yl)-butylamino]-6-chloro-s-triazine with N,N'-bis(3-aminopropyl)ethylenediamine) and

the compound of formula



in which n is from 1 to 15.

**10.** A composition according to claim 1 in which the stabilizers of component (i) are present from about 0.05% to about 20% by weight based on the polymer substrate (a).

**11.** A composition according to claim 1 in which the stabilizers of component (i) are present from about 0.1% to about 10% by weight based on the polymer substrate (a).

**12.** A composition according to claim 1 in which the conventional flame retardants of component (ii) are selected from the group consisting of

chloroalkyl phosphate esters,  
tris(2-chloroethyl)phosphate,

polybrominated diphenyl oxide,  
 decabromodiphenyl oxide,  
 tris[3-bromo-2,2-bis(bromomethyl)propyl] phosphate,  
 tris(2,3-dibromopropyl)phosphate,  
 tris(2,3-dichloropropyl)phosphate,  
 chlorendic acid,  
 tetrachlorophthalic acid,  
 tetrabromophthalic acid,  
 bis-(N,N'-hydroxyethyl)tetrachlorophenylene diamine,  
 poly-β-chloroethyl triphosponate mixture,  
 bis(2,3-dibromopropyl ether) of tetrabromobisphenol A,  
 brominated epoxy resin,  
 ethylene-bis(tetrabromophthalimide),  
 bis(hexachlorocyclopentadieno)cyclooctane,  
 chlorinated paraffins,  
 octabromodiphenyl ether,  
 hexachlorocyclopentadiene derivatives,  
 1,2-bis(tribromophenoxy)ethane,  
 tetrabromo-bisphenol A,  
 ethylene bis-(dibromo-norbornanedicarboximide),  
 bis-(hexachlorocyclopentadieno) cyclooctane,  
 PTFE  
 tris-(2,3-dibromopropyl)-isocyanurate, and  
 ethylene-bis-tetrabromophthalimide,  
 tetraphenyl resorcinol diphosphite,  
 triphenyl phosphate,  
 trioctyl phosphate,  
 tricresyl phosphate,  
 tetrakis(hydroxymethyl)phosphonium sulfide,  
 diethyl-N,N-bis(2-hydroxyethyl)-aminomethyl phosphonate,  
 hydroxyalkyl esters of phosphorus acids,  
 ammonium polyphosphate,  
 resorcinol diphosphate oligomer,  
 phosphazene flame retardants,

ethylenediamine diphosphate,  
polyisocyanurate,  
esters of isocyanuric acid,  
isocyanurates,  
hydroxyalkyl isocyanurates,  
melamine cyanurate,  
melamine borate,  
melamine phosphates,  
melamine polyphosphates and  
melamine pyrophosphates.

**13.** A composition according to claim 1 in which the conventional flame retardants of component (ii) are present in an amount from about 0.5% to about 45% by weight based on the polymeric substrate (a).

**14.** A composition according to claim 1 in which the conventional flame retardants of component (ii) are present in an amount from about 0.5% to about 10% by weight based on component (a).

**15.** A composition according to claim 1 in which the acid scavengers of component (iii) are selected from the group consisting of hydrotalcites and amorphous basic aluminum magnesium carbonates.

**16.** A composition according to claim 1 in which the acid scavengers of component (iii) are present from about 0.1% to about 1.0% by weight based on component (a).

**17.** A composition according to claim 1 in which the acid scavengers of component (iii) are present from about 0.2% to about 0.8% by weight based on component (a).

**18.** A composition according to claim 1 comprising a further component selected from the group consisting of pigments, dyes, plasticizers, phenolic antioxidants, thixotropic agents, levelling assistants, basic costabilizers, nitron stabilizers, amine oxide stabilizers, benzofuranone stabilizers, UV absorbers, sterically hindered amines, metal passivators, metal oxides, organophosphorus compounds, hydroxylamines, and mixtures thereof.

**19.** A composition according to claim 18 in which the further component is selected from the group consisting of phenolic antioxidants, calcium stearate, zinc stearate, phosphite and phosphonite stabilizers, benzofuranone stabilizers, UV absorbers of the 2-(2'-hydroxyphenyl)benzotriazole and 2-(2-hydroxyphenyl)-1,3,5-triazine classes, and sterically hindered amines.

**20.** A process for imparting light stability and flame retardancy to an organic polymer substrate, which process comprises adding to said polymer substrate

(i) at least one sterically hindered amine stabilizer,

(ii) at least one conventional flame retardant selected from the group consisting of the organohalogen, phosphorus containing, isocyanurate and melamine based flame retardants and

(iii) at least one acid scavenger.

**21.** A flame retardant additive combination comprising

(i) at least one sterically hindered amine stabilizer and

(ii) at least one conventional flame retardant selected from the group consisting of the organohalogen, phosphorus containing, isocyanurate and melamine based flame retardants and

(iii) at least one acid scavenger.

**22. A molded polymer article comprising**

(i) at least one sterically hindered amine stabilizer,

(ii) at least one conventional flame retardant selected from the group consisting of the organohalogen, phosphorus containing, isocyanurate and melamine based flame retardants and

(iii) at least one acid scavenger.

**23. A polymer article according to claim 22 which is a construction article selected from the group consisting of roofing membranes, window profiles, siding and moldings.**

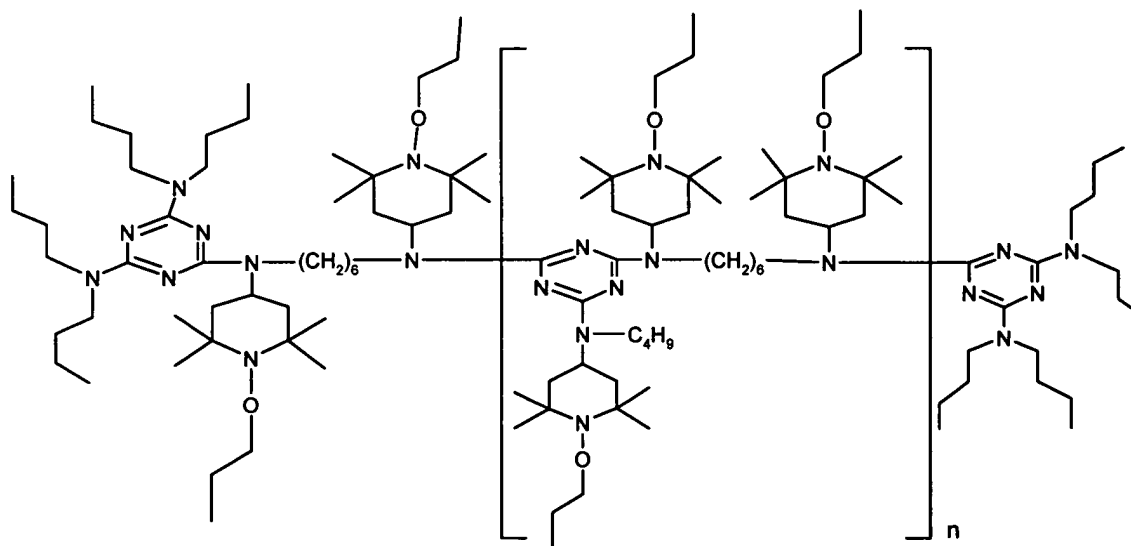
**24. A polymer article according to claim 22 which is a thermoplastic polyolefin article.**

**25. A polymer article according to claim 22 which comprises no filler or a filler in an amount less than about 3% by weight based on the weight of the article.**

**26. A polymer article according to claim 22 containing no antimony compounds or antimony compounds in an amount less than about 1% by weight based on the weight of component (a).**

27. A polymer article according to claim 22 in which the sterically hindered amine stabilizers are selected from the group consisting of

- 1-cyclohexyloxy-2,2,6,6-tetramethyl-4-octadecylaminopiperidine;
- bis(1-octyloxy-2,2,6,6-tetramethylpiperidin-4-yl) sebacate;
- 2,4-bis[(1-cyclohexyloxy-2,2,6,6-tetramethylpiperidin-4-yl)butylamino]-6-(2-hydroxyethyl-amino-s-triazine);
- bis(1-cyclohexyloxy-2,2,6,6-tetramethylpiperidin-4-yl) adipate;
- 2,4-bis[(1-cyclohexyloxy-2,2,6,6-tetramethylpiperidin-4-yl)butylamino]-6-chloro-s-triazine;
- 1-(2-hydroxy-2-methylpropoxy)-4-hydroxy-2,2,6,6-tetramethylpiperidine;
- 1-(2-hydroxy-2-methylpropoxy)-4-oxo-2,2,6,6-tetramethylpiperidine;
- 1-(2-hydroxy-2-methylpropoxy)-4-octadecanoyloxy-2,2,6,6-tetramethylpiperidine;
- bis(1-(2-hydroxy-2-methylpropoxy)-2,2,6,6-tetramethylpiperidin-4-yl) sebacate;
- bis(1-(2-hydroxy-2-methylpropoxy)-2,2,6,6-tetramethylpiperidin-4-yl) adipate;
- 2,4-bis{N-[1-(2-hydroxy-2-methylpropoxy)-2,2,6,6-tetramethylpiperidin-4-yl]-N-butyl-amino}-6-(2-hydroxyethylamino)-s-triazine;
- the reaction product of 2,4-bis[(1-cyclohexyloxy-2,2,6,6-tetramethylpiperidin-4-yl)-butylamino]-6-chloro-s-triazine with N,N'-bis(3-aminopropyl)ethylenediamine) and
- the compound of formula



in which n is from 1 to 15.



**28.** A polymer article according to claim **22** in which the conventional flame retardants are selected from the group consisting of

chloroalkyl phosphate esters,  
tris(2-chloroethyl)phosphate,  
polybrominated diphenyl oxide,  
decabromodiphenyl oxide,  
tris[3-bromo-2,2-bis(bromomethyl)propyl] phosphate,  
tris(2,3-dibromopropyl)phosphate,  
tris(2,3-dichloropropyl)phosphate,  
chlorendic acid,  
tetrachlorophthalic acid,  
tetrabromophthalic acid,  
bis-(N,N'-hydroxyethyl)tetrachlorophenylene diamine,  
poly-β-chloroethyl triphosponate mixture,  
bis(2,3-dibromopropyl ether) of tetrabromobisphenol A,  
brominated epoxy resin,  
ethylene-bis(tetrabromophthalimide),  
bis(hexachlorocyclopentadieno)cyclooctane,  
chlorinated paraffins,  
octabromodiphenyl ether,  
hexachlorocyclopentadiene derivatives,  
1,2-bis(tribromophenoxy)ethane,  
tetrabromo-bisphenol A,  
ethylene bis-(dibromo-norbornanedicarboximide),  
bis-(hexachlorocyclopentadieno) cyclooctane,  
PTFE  
tris-(2,3-dibromopropyl)-isocyanurate, and  
ethylene-bis-tetrabromophthalimide,  
tetraphenyl resorcinol diphosphite,  
triphenyl phosphate,  
trioctyl phosphate,  
tricresyl phosphate,

tetrakis(hydroxymethyl)phosphonium sulfide,  
diethyl-N,N-bis(2-hydroxyethyl)-aminomethyl phosphonate,  
hydroxyalkyl esters of phosphorus acids,  
ammonium polyphosphate,  
resorcinol diphosphate oligomer,  
phosphazene flame retardants,  
ethylenediamine diphosphate,  
polyisocyanurate,  
esters of isocyanuric acid,  
isocyanurates,  
hydroxyalkyl isocyanurates,  
melamine cyanurate,  
melamine borate,  
melamine phosphates,  
melamine polyphosphates and  
melamine pyrophosphates.

**29.** A polymer article according to claim **22** in which the acid scavenger is selected from the group consisting of hydrotalcites and amorphous basic aluminum magnesium carbonates.